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Letter to the Editor

Preexisting prediabetes and the severity of COVID-19

To the Editor,

The emergence of a novel coronavirus disease (COVID-19) in Wuhan, China, is spreading rapidly across the globe. A frequent preexisting comorbidity in COVID-19 patients is type 2 diabetes [1]. Several reports published in *Primary Care Diabetes* and elsewhere have consistently shown that preexisting type 2 diabetes is associated with the disease severity of COVID-19. This includes increased episodes of acute respiratory distress syndrome, intensive care unit admission, mechanical ventilation, and mortality [2,3]. However, the impact of preexisting prediabetes on the course of this disease is far less well studied.

Prediabetes and type 2 diabetes share similar pathophysiology, with the two primary defects being impaired insulin secretion and insulin resistance [4]. Most importantly, the key underlying mechanisms behind the severity of COVID-19 in known type 2 diabetes patients, including chronic low-grade inflammation, impaired innate immunity, poor adaptive immune response to infections, and pro-coagulative state [2], also characterize the prediabetes phenotype, although to a lesser degree than type 2 diabetes [4]. Thus, it can be hypothesized that people with preexisting prediabetes could also experience poor outcomes of COVID-19. For example, in a study by Li et al. in China, out of 453 hospitalized COVID-19 patients, 129 (28.5%) had possible preexisting prediabetes (fasting plasma glucose (FPG) 5.6–6.9 mmol/l and/or HbA1c 5.7–6.4%) [5]. This was associated with a trend towards a higher risk of mortality (Hazard ratio 3.30, 95% CI 0.65, 16.6), compared with those with normal glucose. In a large suburban hospital study from New Jersey, among 184 hospitalized COVID-19 patients, 44 (23.9%) had preexisting prediabetes (HbA1c 5.7–6.4%) [6]. Slightly more than 50% of these patients had persistently elevated FPG in the absence of steroid therapy. These preliminary observations suggest that preexisting prediabetes is much more prevalent in COVID-19 patients than known type 2 diabetes (7 to 17% depending on the disease severity) [1]. They also provide early indications for a possible association between preexisting prediabetes and COVID-19 disease severity. However, large-scale observational studies are required to study this relationship further. To ascertain the status of preexisting prediabetes, it is essential that clinicians utilize the electronic medical records and/or screen all COVID-19 patients with HbA1c in addition to blood glucose [7].

Compared with type 2 diabetes, prediabetes is highly common, the prevalence is rapidly increasing, and most people are unaware of their high-risk status [8]. Thus, even its minimal influence on COVID-19 can impact a large number of individuals. It is therefore crucial to understand the link between preexisting prediabetes and the severity of COVID-19.

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References

- [1] X. Wang, S. Wang, L. Sun, G. Qin, Prevalence of diabetes mellitus in 2019 novel coronavirus: a meta-analysis, *Diabetes Res. Clin. Pract.* 164 (2020), <http://dx.doi.org/10.1016/j.diabres.2020.108200>.
- [2] M. Apicella, M.C. Campopiano, M. Mantuano, L. Mazoni, A. Coppelli, S. Del Prato, COVID-19 in people with diabetes: understanding the reasons for worse outcomes, *Lancet Diabetes Endocrinol.* 8 (2020) 782–792.
- [3] S.R. Varikasuvu, N. Dutt, B. Thangappazham, S. Varshney, Diabetes and COVID-19: a pooled analysis related to disease severity and mortality, *Prim. Care Diabetes* (2020), <http://dx.doi.org/10.1016/j.pcd.2020.1008.1015>, ahead of print.
- [4] V. Grossmann, V.H. Schmitt, T. Zeller, M. Panova-Noeva, A. Schulz, D. Laubert-Reh, C. Juenger, R.B. Schnabel, T.G. Abt, R. Laskowski, J. Wiltink, E. Schulz, S. Blankenberg, K.J. Lackner, T. Münnel, P.S. Wild, Profile of the immune and inflammatory response in individuals with prediabetes and type 2 diabetes, *Diabetes Care* 38 (2015) 1356–1364.
- [5] H. Li, S. Tian, T. Chen, Z. Cui, N. Shi, X. Zhong, K. Qiu, J. Zhang, T. Zeng, L. Chen, J. Zheng, Newly diagnosed diabetes is associated with a higher risk of mortality than known diabetes in hospitalized patients with COVID-19, *Diabetes Obes. Metab.* (2020), <http://dx.doi.org/10.1111/dom.14099>, ahead of print.
- [6] S.M. Smith, A. Boppana, J.A. Traupman, E. Unson, D.A. Maddock, K. Chao, D.P. Dobesh, A. Brufsky, R.I. Connor, Impaired glucose metabolism in patients with diabetes, prediabetes, and obesity is associated with severe COVID-19, *J. Med. Virol.* (2020), <http://dx.doi.org/10.1002/jmv.26227>, ahead of print.
- [7] T. Sathish, Y. Cao, N. Kapoor, Newly diagnosed diabetes in COVID-19, *Prim. Care Diabetes* (2020), <http://dx.doi.org/10.1016/j.pcd.2020.1008.1014>, ahead of print.
- [8] International Diabetes Federation, IDF Diabetes Atlas, Brussels, Belgium, 2019.

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